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## ORIGINAL ARTICLES.

### ON THE USE OF THIERSCH FLAPS IN THE TREATMENT OF TRICHIASIS AND ENTROPIUM.

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At a meeting of the Missouri Valley Medical Society in March, 1891, I described an operation for trichiasis which at that time I considered to be new. I have since learned that a similar, though not exactly the same operation, was described by Jaesche years ago (Zehender's *Monatsblätter f. Augenheilkunde*, 1881, p. 40), but the short communication attracted little notice. Since my paper was read, Schroeder and Natanson (*St. Petersburger Med. Wochenschrift*, 1891, 17) have also described an operation differing but slightly from mine.

My method is as follows: After splitting the lid margin, as in the ordinary Jaesche-Arlt operation, another incision, through the outer flap, about $^1/_2$ cm. in length, is made at each extremity of the first incision, at an angle of about 45° to it, slanting toward the neighboring commissure. Three or four sutures are then put in to turn out the flap containing the lashes, and as the manner of introducing them is of consider-

able importance, I shall describe it at length later on. The sutures having been tied, the gap in the lid margin is filled with a flap shaved off from the arm, the razor passing just deep enough to cause the blood to flow after the flap has been removed. With a good razor and a little practice, it is not difficult to shave off a strip plenty large enough, in a single piece. I find the inner side of the forearm to be the place best suited for the removal of those flaps, on account of the greater ease with which a nearly flat firm surface can be obtained. In women, however, where it is desirable to conceal the scar as much as possible, I generally take the flap from the upper arm, the skin being drawn tense and the subjacent tissues rendered hard by grasping the arm firmly from the opposite side. The razor should be very sharp with a perfectly uniform edge, both it and the skin being kept wet during the operation with some aseptic liquid. When a broad enough strip has been cut, the skin must be pressed against the razor edge with a roll of wet cotton to complete the section. On the wet razor the flap is trimmed with the scissors, if necessary, and then slid directly from it into the gap in the lid margin.[1] It is well to have the bleeding as nearly stopped as possible, but where there is some obstinate oozing, no time need be wasted in trying to stop it before applying the flap, as the latter itself acts admirably as a hæmostatic. When the blood beneath it has been

[1]Schroeder and Natanson (loc. cit.), in common with most operators who have made much use of Thiersch's flaps, mention the difficulty of preventing the flaps from curling up; they also seem to have had difficulty in applying the flap to the wound. As I have had no trouble in either of these ways, I feel like adding a few words on the technique. For cutting the flaps I always use a large razor, nearly flat on one side, which is kept constantly wet. When large flaps are needed as for ectropium (when I have found them to answer admirably). I have easily cut them from the leg and thigh 5 cm. long and 1 cm. broad. The section having been completed, the flap is slid to the toe of the razor and this end is pushed off with some fine instrument and held against the tissues at one extremity of the wound, while the still-wetted razor is withdrawn, the flap applying itself to the wound as fast as it leaves the razor. This transfer should be made as soon as possible after the flap is cut, for if it is left on the razor or anywhere else bathed in a watery solution, it soon begins to curl up; hence if there is more trimming to be done than a stroke or two of the scissors, it had better be performed after the flap has been applied.

pressed out by carefully forcing the flap down with a moist swab of cotton, the bleeding generally stops at once. No retaining sutures are necessary. After pressing the flap into close contact with the surface below, it is sprinkled well with iodoform, a small strip of cotton sopping wet with sublimate 1:10,000 is laid against it, a larger piece of wet sublimate cotton is placed over the whole eye, then a piece of gutta percha or oiled silk, more cotton and a binocular bandage. The dressing is changed after two days and then every day; the stitches are removed on the fourth day if they do not cut through sooner. The wet sublimate dressing is used to prevent the cotton from sticking to the flap. Perhaps a dressing with some ointment would do as well. The average width of the flap introduced is about 8 mm., and at first after healing there is some deformity, but as slight contraction always takes place, and as some of the flap is often turned in so as to apply to the surface of the eyeball, this always disappears, except occasionally at the corners, where there is sometimes a little projection which needs to be snipped off.

Regarding the manner of introducing the sutures, if the lid be split very deeply by the first incision, the outer flap can be turned out sufficiently by simply passing the needles, first, through the edge of the flap, then out, and then through another fold of skin higher up (or lower down), on the lid, But splitting the lid deeply has the disadvantage of leaving quite a gully between the outer and inner flaps, and the thin Thiersch flap must sink deeply into this depression if it is to grow. It is, therefore, desirable to throw the outer flap as far back from the inner as may be necessary, with as shallow an incision in the edge of the lid as is possible. To accomplish this the needles are first passed through the edge of the ciliary border, then out and over a small cylinder of cotton squeezed out of sublimate solution laid lengthwise of the lid, just outside of the cilia, then through another fold of skin just above (or below) the cotton splint. When a suture introduced in this way is tied, the effect is to press the cotton splint deeply into the lid, and thus roll the skin flap strongly outward. The cotton

for the splint is squeezed out of the sublimate solution and rolled into a firm cylinder of the length of the lid, about 4 mm. in diameter. In attempting to obtain the necessary eversion of the outer flap without the aid of the splint, I succeeded only in everting the entire lid with the production of very little gaping of the wound.

I was led to use Thiersch flaps in this manner after considerable experience with Van Millingen's operation of transplanting membrane from the lip into the split edge of the lid. The Thiersch flaps heal in better; they look more natural (a successful transplantation from the lip often giving an unpleasant reddish appearance to the lids); they are much more easily and quickly obtained and placed in position; and sutures are not necessary either for the flap or for the arm, while when lip is used, I have found stitches of advantage both for the flap and for the lip wound. This operation differs from the one originally described by Jaesche, both in the manner of applying the sutures to make the split in the lid gap, and in the addition of the short oblique incisions through the skin and muscles of the lid, at the extremities of the first lid-splitting incision. Both these points are of importance, as they insure a wide gaping of the wound in the edge of the lid throughout its entire extent and allow a wide enough flap to be introduced to guard against any possibility of a recurrence of the trichiasis, in all ordinary cases. It might be supposed that where the epidermis is pulled over so as to rub against the cornea, irritation would result, and to provide against this possibility, Raehlmann (*Deutsche Med. Wochenschrift*, 1891, 1), has proposed, for extreme cases, a double operation, transplanting first a piece of lip to rest against the eyeball, then later on a strip of skin from the upper lid, to widen the lid margin. This, however, is complicating matters unnecessarily. Although in some cases there seems to be a slight irritation, at first, as soon as the outer layers of epidermis cells become thoroughly moistened, the cornea bears contact with them as well as with mucous membrane. There is, however, one class of cases in which lip membrane is to be preferred to a Thiersch flap.

Where the trichiasis is the result of some injury or phlegmonous inflammation so that the lids do not protect the eyeball completely when closed, the greater thickness of tissue which can be transplanted from the lip gives it the advantage. The Thiersch flaps contain, of course, no hair bulbs, and hence are not open to the objection raised against skin flaps from the upper lid and temple, namely, that the lanugo hairs which they contain often cause as much irritation as the original displaced cilia.

The only cases in which I have found it necessary to repeat the operation or to use additional measures to insure a permanent result have been those with very extreme contraction of the conjunctiva and much thickening and incurving of the lid. In two of these the flaps healed on perfectly, but the thick stiffened lids simply rolled them in against the eyeball to supplement the deficient conjunctiva, and it was necessary to repeat the operation on four lids, and on two, in addition, to excise a strip of muscle and turn the lid out by deep sutures. Where, from extreme conjunctival contraction, the skin containing the cilia is so stretched that the inner rows of lashes turn in much more sharply than the others, it is good practice to excise a strip of skin containing the bulbs of the former, before putting in the flap (this approaches the single operation described by Franke in *Hirschberg's Centralblatt*, June, 1890).

I have done the operation 28 times, with good results in all cases except those just referred to. Regarding the permanence of the results, the operation will not, of course, prevent further shrinkage of the conjunctiva if the trachoma has not been cured, but aside from this, the flaps after contracting to between four-fifths and three-fifths of their original width, in the course of the first month or two, reach a definite size which undergoes no further change, and which leaves ample room between the lashes and the eyeball.

I generally use chloroform for the operation, but by injecting cocaine at three or four points of the lid border, the first incisions can be rendered painless; while by spraying the skin

with ether not quite to the freezing point, I have shaved off the Thiersch flaps almost painlessly, without any noticeable impairment of their vitality. In unusually sensitive patients a combination of ether spraying with intra-dermal injections of cocaine, as recommended by Schleich, would probably be desirable. I have lately tried this method on myself and can vouch for its absolute painlessness.

II.

Another operation for entropium and trichiasis, which I have performed in several cases, is a modification of von Burow's, differing from it, however, in important particulars. An incision is made nearly through the tarsal cartilage from the under side parallel to the lid margin 2-4 mm. from the openings of the Meibomian glands, of a length corresponding to the incurved portion of the lid. From each extremity of this incision a shorter cut through the tarsus is made at an angle of 45° with it, slanting toward the neighboring commissure and ending between the cilia. The edge of the lid thus loosened is turned back by three or four sutures arranged over a splint as in the operation just described. The gap thus made in the under surface of the lid is filled by a Thiersch skin-flap, or by a piece of lip-membrane without the use of stitches. Iodoform is dusted over the flap and the same wet dressing and after-treatment used as described above. Theoretically this is the ideal operation for entropium, inasmuch as it restores the natural curvature of the lid by introducing new tissue at the point where the disease has destroyed the natural membrane. I have done it seven times with good results, except in one case where lip was used, and where, through a mistake of the nurse, a pervious plaster was used to cover the wet dressing, instead of oiled silk or rubber. In this case the cotton next the flap dried completely, and on removing it the piece of lip came with it. One might, *a priori*, suppose that lip membrane would be far preferable to skin, for this operation, but I have found the skin, eventually, to answer perfectly. Until the first layer of epidermis has pealed off there is, in some cases, considerable irritation of the cornea, but this is only

temporary; after a week or so the cornea bears contact with the skin graft without reaction. To shorten the period of irritation following the operation, it is well to pare off any superfluous non-adherent edges of the flap, and to gently scrape off the upper epidermal layers as soon as they become loose enough to be easily detached. In addition, I generally begin the use of the sulphate of copper crystal on the fifth or sixth day. This I have found to be important, as the operation and the bandaging generally stir up an inflammation of the lids which helps irritate the cornea, even where, before the operation, the trachoma seemed to have run its course completely. Just what the scope of the operation will be cannot as yet be said. I have not tried it on any extreme cases, nor upon the lower lid. It has the advantage, over all operations in which the lid border is split, of leaving no doubt as to which side of the incision all the hair bulbs lie on. It can, moreover, be done under cocaine, without even the pain necessary to the introduction of the hypodermic needle into the lid. If the lid be held everted with a lid clamp, and a bit of cotton soaked in 20% cocaine solution be left lying along the line of the proposed incisions for 8 or 10 minutes, the cutting causes no pain worth mentioning. The lips can be anæsthetized in the same way if lip membrane be desired for the flap; or the ether spray, with cocaine injections, can be used to deaden the skin for obtaining a Thiersch flap. The advantages of closing the gap in the lid with a graft instead of allowing it to close by granulation, as done by von Burow and Green, are obvious. The short oblique incisions through the tarsus which I have added, greatly increase the effect of the von Burow tarsotomy. The excision of a narrow strip of skin from the upper lid I have not found necessary. The use of the cotton splint for making the wound gape widely is not so important, in this operation, as in the preceding. The lid wound can be made to gape sufficiently without the splint, but with it, in addition to the gaping produced, the lid is rolled out so that the dressing can be applied with greater accuracy, directly to the flap which closes the wound.

# CASES OF TRAUMATIC HÆMORRHAGE INTO THE EYEBALL WITHOUT LESION OF THE EXTERNAL TUNICS.

BY G. STERLING RYERSON, M.D., L.R.C.S., EDIN.,

Professor of Ophthalmology in Trinity Medical College, Toronto.

Cases of hæmorrhage into the globe of the eye, the result of trauma, are not very common, and as much interest attaches to the prognosis and treatment, I feel justified in putting the following cases on record:

CASE I.—M. J., æt. 29, hotel clerk, French Canadian, was opening a bottle of double soda water on January 3, 1888, when it exploded prematurely and struck him in the right eye. When I saw him an hour later the anterior chamber was almost entirely filled with blood; could not even discern light; tension slightly increased, pain severe. There is no lesion of the cornea beyond a slight abrasion. Warm belladonna fomentations were ordered, under which and atropine pain subsided. There was not at any time much conjunctival injection. Hypodermic injections (5 minims of a 2% solution of pilocarpine nitrate) into the temple were begun. Every third day two leeches were used, and free bleeding from the bites was encouraged by spraying with warm water.

In four days the anterior chamber was nearly clear of clots and there was some perception of light. At the end of six weeks, V.=$^{15}/_{LXX}$. The pupil was still dilated, though atropine had been stopped for three weeks. Eventually the vitreous quite cleared up, the pupil regained its normal size, but was somewhat sluggish, and very fair vision was regained at the end of eight months.

CASE II.—On August 3, 1891, R. M., æt. 14, was brought to me, having been struck that evening on the left eye with a stone. Vision reduced to perception of light; no great pain. The anterior chamber was nearly filled with blood clots; no external wound of eyeball, but eyelid was bruised and lacerated. Ordered bleeding and atropine. The hæmorrhage proved to be entirely in the anterior chamber, as under this treatment, aided by half a dozen hypodermic injections it cleared up in about two weeks and the eye seemed quite restored in six weeks' time. V.=$^{15}/_{xx}$.

CASE III.—J. A. R., æt. 6, was brought to me from a neighboring town on May 9, 1891. He had been hit in right eye by a small bullet from a toy spring gun four days previously. Vision was *nil.* The iris could be dimly seen at the margins of the cornea. The blood was of a bright hue; tension +1; considerable pain and swelling of eyelid; no external lesion of the eyeball. On account of the increased tension, I determined to evacuate the anterior chamber, which was done the following day under an anæsthetic. Quite a smart flow of bright blood followed the incision of the cornea. The clots still remained in the anterior chamber, I not being able to remove them with forceps, or by gentle pressure. I felt that the eye was lost when next day I found no improvement of sight, tension as before. The father, however, was most anxious to save appearances and urged me to do what I could to avoid removal of the globe. I accordingly put him on the pilocarpine injections and used leeches frequently. The clots gradually cleared up, and on June 5, he could see large objects. There was still a rusty deposit on the posterior surface of the cornea, By July 10, the vitreous had pretty well cleared up.

The child was put on iodide of potash and sent home. I saw him again November 7; the eye was apparently quite as good as the other in appearance, but the pupil was somewhat larger and sluggish. Vision R.=$^{15}/_{xxx}$. I might remark, in passing, that atropine should not be used frequently during the pilocarpine treatment. It is better to instill it an hour after the injections where its use is deemed necessary.

Leeching *before* the injections tends to increase the absorbifacient action of the pilocarpine. It is also well to cause the patient to lie quietly in a darkened room after both leeching and injections. Too early exposure to light causes sudden increase of vascularity. The dose required to produce mild diaphoresis will vary with individuals. I prefer to inject in the temple because the soreness left by a number of injections acts as a counter irritant.

CASE IV.—E. L., æt. 24, club waiter, came to me November 11, 1891, stating that he was opening a bottle of apolinaris two days before when the cork unexpectedly struck him in the eye. The anterior chamber was full of blood. V.=perception of light. He said that he had seen two other oculists, and that they had told him that there was no hope of saving the eye, and that he had better have it removed. I put him on the treatment used in the other cases and to-day, December 2, the anterior chamber is free from clots. The vitreous contains a few rather large floating opacities, which, I have no doubt, will eventually clear up.

REMARKS.—These cases are examples of rupture of intraocular vessels either in the iris or choroid without lesions of the external tissues, discoloration or other injury to the lens, or detachment of retina.

I have observed several cases of rupture of the choroid, and it is curious to notice that hæmorrhage into the vitreous is rarely present. In one case of extensive rupture I saw in the clinic of my late friend and tutor, Prof. Becker, in Heidelberg, there were floating opacities in the vitreous which were believed to be the remains of clots, but as the case was not seen at the outset, they might have been due to disturbance in the nutrition of the vitreous or to effusion. It is very difficult to formulate a theory which will satisfactorily explain why blows on the eye of apparently equal force should produce so many different lesions. I have never been able to detect the exact source of the bleeding. It is, however, gratifying to be able to say that free leeching and the hypodermic use of pilocarpine nitrate will, in almost all cases, bring about a satisfactory result.

# SPASMODIC MYDRIASIS A SEXUAL NEUROSIS.

BY S. MITCHELL, M.D., HORNELLSVILLE, N. Y.

I have recently had under observation five cases of spasmodic mydriasis, two male and three female. They were all under 40 years of age, and in each case I was able, to my own satisfaction, to trace the origin of their disease to an irritation, or at least an over-excitation, of the sexual apparatus.

The two male cases were young men under 25 years of age, both busily engaged in paying suit to their future wives, and as both were of an amorous disposition, but strictly virtuous, they were in a position to have their sexual appetite frequently stimulated and not appeased, a condition of affairs nicely arranged to produce an endless variety of neurasthenic symptoms.

The three female cases were all married, but two of them had separated from their husbands, and all were living lives that were far from virtuous, and each being of a neurotic temperament, they were by their mode (or rather *demi-mode*) of living, in an excellent position to become the victims of almost any neurotic disorder. Thus in all five cases having an effect similar in every particular, it was very natural to suspect that the cause in each was the same, viz., irritation of the sexual apparatus.

There was a refractive trouble in but one case, and that was one of the female cases, where .75 D hyperopic astigmatism, according to the rule, was found to exist in both eyes. The correction of this gave entire relief from former headache, but did not have any effect upon the attacks of mydriasis, which would return with their wonted frequency. In every

case except one the trouble was with but one eye at a time, alternating from one to the other.

The treatment employed was pretty much all on the expectant plan, and to correcting any errors of the general health found to exist. The two young men speedily and entirely recovered after marriage. The female portion of the group have all drifted away from this place and from my observation. I have no doubt, however, that if the moral tone of their lives still continues to be lax, the ciliary muscles of each with a corresponding lack of physical tonicity still continue to have their usual periodic spells of relaxation from the even tenor of their ways.

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## NOTE ON DR. S. C. AYRES' CHALAZION-FORCEPS.

BY ADOLF ALT, M.D., ST. LOUIS.

The accompanying cut is that of a little instrument which Dr. S. C. Ayres had made in order to better squeeze out the chalazia. I have tried the instrument in a number of cases

of hordeolum after the incision and in a few cases of chalazion and have found it to be a very nice and useful addition to our armamentarium. I recommend it to our colleagues.

# TRANSLATONS.

## THE TREATMENT OF BLEPHARITIS, OF ECTROPIUM AFTER BLEPHARITIS, AND OF ECTROPIUM SENILE ET SARCOMATOSUM.

BY V. FUKALA, M.D., PILSEN–KARLSBAD.

Translated by A. ALT, M.D.

The treatment of blepharitis is by no means as simple and easy as it is described in many ophthalmological works. Aside from trachoma there is no other eye disease which defies every treatment for so long a time as does blepharitis, and often when it appears to be healed, as in trachoma this is, as a rule, only for a short period and the disease soon returns. Thus blepharitis will often last for decades, nay even through a whole life time, and although there may be times of improvement there is no lasting cure. Blepharitis, therefore, as Fuchs says in his text-book, is an eminently chronic disease. Where to look for the cause of the obstinacy we do not know; although blepharitis but seldom does any serious harm to the eyes, it at least mars their looks considerably and the patients may often be recognized from afar by their red lid margins and the stillicidium.

At present we differentiate only between two kinds of blepharitis, namely, one without ulcers, blepharitis squamosa, and one with ulcers, blepharitis ulcerosa. In the first form the skin around the cilia is reddened and here and there covered with small scales. In the second, the skin is sore and around

the cilia shallow or deep ulcers are found which are covered by pus and dried crusts. Both forms are only different degrees of one and the same pathological process and may be found side by side. For the older division of blepharitis in a glandularis, ciliaris, solitaris, tylosa, etc., we have no uniform basis, since it takes into consideration on the one hand the different phases of one and the same pathological process, and on the other hand the symptoms that are most apparent. The main role in the treatment has been played of old by the 3% ointment of the red precipitate of mercury and the remedy is praised as infallible; this is not, however, true, and the ointment can only produce an alleviation but no true cure. We have to make the same statement in regard to the white precipitate of mercury, although it acts much milder than the red. Some authors consider the blepharitis an eczema of the skin of the lid and in consequence use Hebra's diachylon ointment by spreading it on linen and laying it on the lids (Michel, Lehrbuch der Augenheilkunde) I have seen better results from compresses soaked in liquor plumbi acetici as Schweigger in Berlin uses it. He puts 10 drops of the solution in a cup of water and applies the compresses soaked with it to the lids for half an hour two or three times during the day. Schiess-Gemuseus and Saemisch[1] examined the roots of epiated cilia from lids affected with blepharitis and found the bulbi swelled and the roots and shafts diseased. Since then they epilate the cilia as we do in sycosis. This does not agree perfectly with what Weichselbaum[2] found.

His experience is that even in intense ulcerous blepharitis the hair bulbs and papillæ are often perfectly intact and are but secondarily affected in consequence of the inflammatory process. The surest remedy in order to cure every kind of blepharitis is the pencil of mitigated silver nitrate. I use only

[1]Schiess-Gemuseus Beiträge zur pathologischen Anatomie des Auges. Virchow's Archiv für pathologische Anatomie, Band 27, Heft I. and II., Seite 132.

Pagenstecher, Saemisch und A. Pagenstecher, Klinische Beobachtungen aus der Augenheilanstalt zur Wiesbaden zweites Heft.

[2]Archiv für Augenheilkunde, XXIII, S. 367.

the very thin and finely pointed pencils with which I touch the inflamed lid margin. In cases of blepharitis ulcerosa the dried crusts must first be soaked with warm water and be carefully removed before the application. The next day the blackened crusts are again soaked and removed and a further application of the pencil is made. This procedure is continued as long as there are any traces of disease of the lid margin, namely redness or ulcers. In order to mitigate or to remove the pain caused by the pencil, the lid margin may first be brushed with a cocaine solution of from 5 to 8%. By this method of treatment I have almost always seen a lasting cure. In some forms of ulcerous blepharitis in adults with consecutive ulcers of the cornea and intense catarrhal inflammation of the conjunctiva which could not be cured by the method just detailed I have succeeded in bringing about a rapid cure by removing the external edge of the lid-margin according to Flarer.[3]

*The Post Blepharitic Ectropium* aside from that following burns and caries is the most frequent form of ectropium. This is due to the frequency of blepharitis among younger and older people. Since the inflammation of the lid margin obstinately resists the treatment and recurs with particular frequency it favors a series of consecutive affections. The irritation of the conjunctiva contributes to increase the number of ulcerations on the lid margins; this by reflex action is followed by an increased lachrymation, in consequence of which the tears are not carried to the nose by means of the drainage apparatus but run over the lid margins down the cheek. When this stage is once reached the lower lid can no longer return to the norm.

There are two circumstances which under such conditions particularly bring about the formation of an ectropium. The lower punctum lachrymale is everted from the lacus lachrymalis and the normal drainage of the tears is soon almost totally stopped. From this, at first slowly, later on more rapidly, a second affection is developed, namely, an acute dermatitis of

[3]Knapp-Schweigger's Archiv. für Augenheilkunde, XXIII, Seite 364.

the lower lid and cheek which after some time becomes chronic, and thus by the shrinkage of the skin ectropium of the lower lid takes place which baffles every form of medication. Not alone ointments and collyria but likewise operative procedures are useless against this ectropium. Since it is so frequent an affection a series of different operative methods have been made use of in order to cure it and this alone proves that such an ectropium is with difficulty cured.

For two years I have made use of a method against this ectropium which has shown itself successful in every respect. *According to the well-known Von Graefe's method*[4] *the skin of the lid is loosened from the tarsus all along its margin and then the margin of the tarsus with the tarsal conjunctiva is stitched to the skin of the lid, but lower according to the degree of the ectropium.*

After the skin has been loosened from the tarsus, which can only be done during narcosis a triangular piece of skin is removed from the outer angle after the manner of von Graefe. As by this means the usually elongated lid margin is to be shortened it is evident that the width of the excised triangle must correspond to the degree of elongation of the lid.

The sutures are placed in the same manner as in Snellen's thread operation.[5]

The needle is at first introduced near the outer angle and about 4 mm. below the lashes from the skin of the lid and vertically through the new formed wound lip and then passed at a corresponding point (that is just as far from the angle) but *close to its upper margin* through the tarsal tissue toward the conjunctival sac. Then the needle is returned through the cartilage, several millimeters inward and brought out through the skin at a point from 3 to 5 mm. lower; entrance and exit in the tarsal tissue lie at the same height as they do in the skin. Finally the threads are tied over a bead or a roll of adhesive plaster and *thus the tarsus is fastened to the skin below*

[4]Archiv für Ophthalmologie, IV, II Theil., S. 201.

[5]Klinische Monatsblätter für Augenheilkunde, 1872, S. 36.

*the lid margin.* Three or four such sutures are introduced by the side of each other and they are allowed to remain from three to four days.

They are borne without any reaction. Bandage. The immediate effect of this operation is that the ectropionized portions of the conjunctiva and the tarsus are attached to a lower portion of the skin of the lid; and, since there are two wound surfaces in close contact, a lasting union must ensue.

This method of operation differs from the one von Graefe used in that the loosened skin and the tarsus can be exactly adapted to each other *according to the wish of the operator* and are held in that position and forced to grow together by the sutures. In von Graefe's method the union is dependent on and may be interfered with by all sorts of casualties. He tried to prevent the retraction of the skin-flap by threads which were fastened to the forehead. This has, however, but little effect, since the tension of the skin causes disagreeable sensations and later on such pain, that the patients insist on the removal of the threads. Furthermore, the stretching of the flap produces swelling and other disagreeable conditions. Secondary shrinkage later on draws the usually inflamed skin downward and thus a relapse is produced. In one word this method does not prevent relapses. Samson's method, in which a triangular flap, point downward, is loosened and stitched higher up, is not effectual enough, since this flap shrinks, and thus a relapse is brought about. My method is even more certain than Snellen's thread-operation. The latter does not insure against relapses, since after the threads have been removed, the lid returns to its former position.

From the foregoing, my method is a combination of the methods of von Graefe and of Snellen. The shortcomings of the one method are supplemented by the advantages of the other.

In von Graefe's method the wound surfaces are not stitched together and in Snellen's method there is no union of two wound surfaces and yet it will only be possible to cure ectropium when these two factors are simultaneously at work.

*Ectropium Senile and Sarcomatosum* in old people takes its origin from the loss of tone of the orbicularis palpebrarum muscle and from trachoma or chronic conjunctival catarrh when these diseases produce a considerable swelling of the conjunctiva.

It is well known that these forms of ectropium are difficult to cure because they are very apt to relapse. I operate these ectropia with perfectly certain success *by excision and subsequent stitching of the lid margin to the conjunctiva.* This method is absolutely certain since relapse is impossible and it moreover has the great advantage that it is easily performed. It does not interfere with lid movements later on and does not produce tear dropping. I at first loosen the tarsal tissue from the skin of the lid in the intermarginal portion, then with the scissors a cut is made through the conjunctiva parallel to the lid margin by means of which the ectropionised portion is removed. Finally the conjunctiva is united to the lid margin by four or five sutures. I have observed patients for two years after they had been operated on by this method and can be perfectly satisfied with the success. The secondary contraction of the scar considerably helps to shorten the elongated lid margin.

*The combination of the two methods* has also a great advantage in certain cases. Twice it has happened to me that in operating according to the first method I transplanted the tarsus and conjunctiva not quite low enough, and thus a small degree of ectropium remained behind as may happen now and then. In these cases I excised the remaining partial ectropium according to the second method. The insult was trifling and the success perfect. In all such cases this procedure has shown itself to be certain, simple and without danger.

# SELECTIONS.

## TUMORS OF THE ORBIT, SECONDARY OR CONSECTUIVE TO TUMORS OF THE NEIGHBORING BONY CAVITIES.[1]

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In considering the subject of tumors involving the orbit, it is important to distinguish between those tumors which originate in the orbit, either in the orbital tissue itself, the sheath of the optic nerve, or the periosteum of the bony walls, and those which arise in some one of the bony cavities, and which involve the orbit secondarily. This distinction is important, not only from the diagnostic standpoint, but also from the side of surgical interference; for the location and extent of a growth involving the orbit frequently decide not only the question of an operation, but also the nature and extent of the operation itself. Many of the so-called orbital tumors arise in the ethmoid cells, the sphenoid antrum, the frontal sinus, the naso-pharynx, or maxillary antrum. It is a well-known fact that tumors of the bones of the skull or of the sinuses contained within these bones may, and generally do, extend in every direction from one sinus or labyrinth to another, and often exist for a long time and reach a large size before appearing in the orbit. The growth of these tumors is generally

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slow and insidious, though occasionally it is exceedingly rapid. A very extensixe disintegration of the ethmoid, sphenoid, and maxillary bones from tumors starting in their respective sinuses may have already occurred before the presence of such a growth is manifested in the orbit by the usual signs of protrusion or displacement of the eyeball, pain on pressure along the orbital walls, or directly backward, and the visible or tangible presence of the growth itself within the orbit.

These tumors, in the literal, narrow sense of swellings, may be either fluid or solid. The former almost always arise in the frontal sinus or ethmoid cells, and contain pus or mucus. The latter are either solid or densely gelatinous, and are always malignant in character. and arise in the maxillary, sphenoid, or ethmoid antrums. Finally, a by no means uncommon growth in this locality is a bony tumor or a real ivory exostosis arising from the bony walls surrounding the orbit. A brief glance at the anatomical relationship of the bones at the base of the skull will enable us to understand more clearly the nature of these growths and the important relations they bear to the cavity of the orbit and its contents.

The *frontal sinuses* are situated within the frontal bone at the level of the nasal boss of that bone, just above the root of the nose. They are usually two in number, separated by a more or less complete partition of bone, which is generally, though not always, in the median line. Their dimensions are very variable, but their size usually increases with the age of the patient. Their form is very irregular. The anterior wall is the thickest, while the cranial and orbital walls consist mainly of compact bony tissue, with a thin layer of cancellous tissue in the center. Each frontal sinus opens into the infundibulum of the ethmoid by a canal in the anterior cells of this bone, and called the frontal or frontal-nasal canal. Each sinus is lined by a thin, smooth, rosy mucous membrane, slightly adherent to the bone, and consisting of two layers—one mucous, the other periosteal.

The most frequent diseases met with in the frontal sinus are:

*First*, mucocele, or a collection of mucous; and, *second*, abscess or empyema. Empyema or abscess of the frontal sinus is usually an affection of adult life, though it is met with most frequently between the ages of twenty-five and thirty. It does not occur in childhood, as the sinuses are not developed to any extent at this period of life. It is found oftener among men than women, and this is probably due to anatomical peculiarities, such as the following: The sinuses are much more developed in men than in women, the infundibulum is wider and communicates more directly with the nasal fossæ, and through the latter with the external air. Hence infectious agents may more easily enter them. The left frontal sinus is more frequently attacked than the right, and the cause of this is as yet unknown. It is not uncommon to find, at the time of operation, that the suppurative process began in one sinus, perforated the bony septum, and involved the other sinus secondarily.

The *ætiology* of suppuration of the frontal sinuses is somewhat obscure. It has been attributed to *tuberculosis* and *syphilis*, but this is not strictly correct. Both these constitutional affections may produce an osteo-periostitis of the frontal bone, accompanied or followed by extensive caries or necrosis and profuse suppuration, and the frontal sinus may be invaded by the pus, but always in the direction from without inward. The same argument applies to *erysipelas*, though here it must be admitted that the diseased process might extend through the mucous membrane of the nasal fossæ to the infundibulum, aud thence to the frontal sinus. The sinuses have also been known to suppurate during the decline and convalesence of scarlatina and typhoid fever, and during a severe attack of influenza. Wounds of the superior orbital margin may possibly produce abscess of the sinuses, but only after a lapse of time, the diseased process extending gradually through the bone. Foreign bodies, whether inert or alive, on entering the nasal meatus and penetrating to the sinus, may set up a chronic suppurative process. Inflammatory lesions of the mucous membrane of the nasal fossæ are found to exist in many

cases of abscess of the frontal sinus. Finally, polypi of the nasal fossæ have been known to precede the development of abscess of the sinus.

All these are, of course, mainly predisposing causes. In order that suppuration should occur in a frontal sinus, there must be an entrance and proliferation of pyogenous microbes in the cavity of the sinus. The latter may penetrate directly into the sinus without affecting the nasal fossæ, or the suppuration of the sinus may be induced by that of the nasal fossæ. In the latter case, infection of the sinus may occur through the frontal canal or infundibulum, or by way of the lymphatics. Once invaded by the microbes, the mucous membrane of the sinus swells and becomes thicker, and thus the canal of the infundibulum is narrowed and eventually obliterated. Then the pus begins to accumulate in the sinus. In simple catarrh of the sinus the infundibulum becomes closed, but here the result is an accumulation of mucus, and not of pus. If this is to become an abscess, there must be a second element of an infectious nature present. When a sufficiently large opening has been made into the sinus and the pus has been discharged from the abscess, the mucous membrane lining the sinus is seen to be red and inflamed, swollen and thickened, sometimes to ten or twelve times its natural thickness. Its surface is rough, granular, and even fungoid. Large quantities of these fungoid excrescences may be removed with a curette, or destroyed by the injection of some caustic. The disease may perforate the bony wall of the sinus naturally, usually the inferior wall, but always by a small opening; or it may perforate the cranial wall and enter the cavity of the skull. Here the dura mater usually limits the extent of the abscess. Sequestra of bone are not uncommon, but they are usually very small and float freely in the pus. When these cases yield rapidly to treatment they are of two kinds; either the abscess has been a recent one, which has produced superficial lesions of the mucous membrane, or there has been extensive necrosis. In the latter case the frontal and orbital walls of the sinus have been cast off, the cavity of the

sinus has disappeared, and cicatrization has followed, leaving a deep pit or hollow in this region. The *diagnosis* is difficult, especially in the beginning.

Guillemain thinks there is only one constant symptom, the supra-orbital pain, which is sometimes intense. But I have known cases of abscess of the frontal sinus in which there was never any pain at any time during the development of the abscess. The disease usually resists all medication, and only disappears when the pus is evacuated. If with the pain there is coryza, ozæna, or a purlent discharge from one nostril, and the frontal boss is painful and protuberant, and if the eye is displaced downward and outward, the lesion is almost certainly in the sinus, though it may not be an abscess. Hence in these cases a thorough anterior and posterior rhinoscopic examination should always be made. At a more advanced stage of the malady, when the orbit is involved, the diagnosis may be still more difficult, unless the disease is of the acute variety, when there may be some of the signs of inflammation present. Still, even here, while there may be displacement of the eye downward and outward, there is rarely any protrusion of the eye forward. A small orbital abscess, lying behind the tendon of the orbicularis muscle, compressing the canaliculus and causing epiphora, might be confounded with abscess of the lacrymal sac, but if a probe can be passed into the sac the latter possibility is excluded.

*Treatment.*—If we are sure that an abscess of the frontal sinus is present, the indications are to open it as soon as possible, drain it carefully and inject antiseptic solutions, and thus put a stop to the suppurative process. The incision should be made, starting from near the inner canthus, immediately beneath the superior orbital arch, directly outward, and from an inch and a half to two inches long, so that if the bony wall of the sinus, which is here very thin, has not already been perforated, it may be easily opened. The pus then flows out, and the sinus should be thoroughly washed out with a solution of mercuric bichloride (1 to 1,000). The opening should be large enough to admit the little finger, and the cavity of the

sinus should be carefully examined for fungoid granulations or osteophytes, and these, if found, should be thoroughly removed. Then the septum between the sinuses should be examined for a perforation, for in some cases this partition wall has been found not only perforated, but nearly entirely absorbed. A drainage-tube should then be inserted, and the cavity carefully washed out twice daily. The re-establishment of the channel of communication between the sinus and the nasal fossa is sometimes advisable. This may be done by opening into the ethmoid cells by chisel or mallet, or by trephine, or by introducing a catheter through the fronto-ethmoidal canal and then a drainage-tube through the nose, after the plan advocated by Panas. After the opening of the sinus along the orbital margin, the first thing necessary is a thorough irrigation of the sinus. After the pus ceases to be discharged through the drainage-tube, the cavity generally begins to granulate from the bottom, and in from three to four months the cavity has usually been healed.

*The Ethmoid Cells or Labyrinth.*—The air cells or spaces of the ethmoid form a pneumatic labyrinth, which increases in width from above downward. From the uncinate process to the cavity of the skull the ethmoid is pushed into the cavity of the nose. Anteriorly it is connected with the lachrymal bone, and posteriorly it is often connected with the orbital portion of the palate bone. The posterior ethmoidal cells and the cavity of the sphenoid bone open in the upper nasal meatus. In rare cases the ostium maxillare is absent, and the maxillary antrum communicates with the ethmoid cells and sphenoid antrum. Sometimes the ethmoid labyrinth sends processes into the frontal sinuses, and occasionally the lateral ethmoid cells project very markedly toward the orbit.

*The Sphenoidal Sinus or Antrum.*—The anterior, posterior and lateral walls of the sphenoidal antrum or sinus are always thin, and sometimes very thin. The anterior wall may be entirely wanting and then the sphenoid sinus opens into the ethmoid cells. The hollow spaces in the ethmoid and sphenoid bones are by some regarded as a respiratory organ for the an-

terior and middle fossæ of the skull. However this may be, the anatomical relations between ethmoid and sphenoid are so intimate that any chronic process, such as a morbid growth, starting in the sinus or cells of either bone, is almost certain to involve the other at a comparatively early date.

The *symptomatology* of the diseases of these bony cavities in the vicinity of the orbit is always perplexing, and a diagnosis is thus rendered extremely difficult. In inflammation of the frontal sinus pain is sometimes felt in the region of the inner or nasal end of the eyebrow. In inflammation of the maxillary sinus, pain is usually felt in the infra orbital region. In inflammation of the ethmoid cells or sphenoid antrum, positive subjective symptoms are wanting. Inflammation of the mucous membrane of these adjoining cavities can by no means be readily distinguished from inflammation of the bony walls of these cavities. In intense suppurative inflammation the periosteum suffers also, and this may lead to necrosis. It is probable that in many cases of nasal disease in which orbital abscess is observed the inflammatory process extended from the nose to the ethmoid cells, and thence to the orbital tissue. The reverse may also be the case, the disease starting in the orbit and extending to the ethmoid cells and thence to the nose (see Vossius, *Archiv f. Ophthalmolgie*, xxx, 3). Collections of pus in the frontal sinus may lead to orbital abscess, and even to abscess of the brain through the medium of the ethmoid cells. An inflammatory process may extend from the maxillary antrum to the ethmoid cells, orbit and brain (see *Edinburgh Medical Journal*, May, 1866), the walls of the ethmoid cells here becoming absorbed by pressure from the abscess. In caries of the lamina papyracea the subjective symptoms are dull pain, increased by pressure in the neighborhood of the diseased bones and vertigo. Redness of the lids at the inner canthus may be present. A hard tumor may be felt at the inner canthus, and later occur fluctuation, strabismus, diplopia, exophthalmia, limitation of the movements of the eyeball, and vision becomes reduced.

Owing to defective closure of the lids, ulceration and per-

foration of the cornea may occur, followed by phthisis bulbi.

In all cases of inflammation the opening of the ethmoid cells, evacuation of pus and the removal of fragments of carious bone are justified, especially if it is supposed that pus has formed. There may be indications also for opening the neighboring cavities, such as the frontal sinus, the nasal meatus, the sphenoid and maxillary antrums.

In *mucocele* of the *ethmoid cells* the symptoms are a gradual painless development of a tumor on the inner wall of the orbit, which later shows signs of fluctuation. The eye is pushed forward and outward and sometimes downward. Until fluctuation appears, it may be confounded with an osteoma growing from the inner wall of the orbit. Puncture or incision of the tumor will decide the diagnosis. It is very often connected with a similar condition of the frontal sinus, but it may proceed directly from the nasal meatus.

*Naso-pharynx.—Polypoid* growths in the naso-pharynx may extend into the ethmoid cells. They may possess a partly cartilaginous consistency. It can not be definitely determined whether all the visual defects which occur in polypi of the naso-pharynx are caused by pressure of the after-growth on the optic canal, or in the ethmoid cells, and thence against the inner wall of the orbit. Whatever the cause, the loss of vision is due to pressure on the optic nerve.

*Enchondroma* of the *ethmoid* is very rare, and always starts from the base of the skull.

*Polypi* originating in the ethmoid cells and confined within these limits are relatively rare, but nasal polypi usually start from the ethmoid. Polypi of the naso-pharynx, on the other hand, not uncommonly penetrate the ethmoid cells. When the bridge of the nose seems widened, the orbit is narrowed by the pushing outward of the inner wall of the orbit, and protusion of the eyeball in various directions results.

*Fibroma* originating in the ethmoid itself has been observed but once (see *Wiener med. Jahrb.*, 1882), and hence it is generally believed that a fibroma involving the ethmoid usually starts from the bones of the nose.

*Osteoma* of the ethmoid bone usually starts from some neighboring cavity. The first objective symptom is a very hard tumor at the inner canthus of the eye. Then follow swelling of the neighboring part of the cheek, protrusion of the eyeball forward and outward, and diplopia. The inner canthus is pushed forward, as are also the nasal and lachrymal bones. The tumor also usually involves the nasal meatus, pushes the septum nasi to one side, and closes one or both sides of the meatus. It pushes the hard palate downward. The vision may be normal or diminished. There may be choked disc and suppuration of the cornea from an inability to close the lids completely over the eye. If the osteoma of the ethmoid be encapsulated, it may easily be separated from its bony attachments. These osteomata never tend to penetrate the cranial cavity, and in this they differ from bony tumors of the frontal sinus. Their operative removal is not as a rule difficult. If, on the contrary, they arise from the frontal sinus and penetrate the ethmoid, their removal is usually dangerous and gives bad results.

*The Sphenoid Bone.*—Disease of the body of the sphenoid, whether ending in caries and necrosis or not, may cause not only exophthalmus, but disturbance of vision (see *Klin. Mon. f. Augenheilk.* for August, 1863), on account of the close proximity of the optic canal. Pain occurring in the course of disease of the body of the sphenoid may show itself in a totally different part of the area of influence of the trifacial nerve, and thus lead to a faulty diagnosis. (See *Union méd.*, 1872, and Virchow's *Archiv f. path. Anat. u. Physiol. u. f. klin Med.*, xvi, 5 and 6).

*Polypi* in the sphenoid sinus may develp there independently, or they may originate in the naso-pharynx and penetrate thence into the sphenoidal sinus and ethmoid cells. They may also perforate the bone and enter the middle fossa of the skull, and even cause meningitis without giving rise to any disturbance of vision.

*Osteomata* of the sphenoid may start from the periosteum or the diploe. In many cases they are developed from the em-

bryonic remains of cartilage, and sometimes arise in the cavities themselves. They tend to penetrate the cavity of the skull, and, by compression of the optic nerve in the optic canal, early lead to blindness of both eyes.

*Hyperostosis* and *exostosis* of the sphenoid may produce the same orbital and ocular symptoms as osteoma of the sphenoidal sinus does.

*Enchondroma* of the sphenoid is excessively rare, only one case having been reported in literature.

*Sarcoma.*—In sarcoma of the base of the skull it is generally very difficult to determine the point of origin. Virchow says that they never start pri.narily from the mucous membranes of cavities, but from the underlying bone; and the mucous membrane is either secondarily affected or pushed forward by the growth. The general symptoms are here loss of sight, hearing, and smell, facial paralysis and neuralgia, vertigo, somnolence, vomiting, loss of memory, hemiparesis, and loss or impairment of speech. Death results from meningitis or encephalitis. There is no record in literature of sarcoma beginning primarily in the ethmoid, but it may extend into it, and thence through the lamina cribrosa into the cranial cavity or through the lateral wall of the ethmoid into the orbit.

*Carcinoma.*—Only one case is reported where the carcinoma started in the sphenoidal sinus.

*Maxillary Antrum.*—The most frequent pathological process met with in the maxillary sinus is *empyema* or *hydrops* of the antrum. Pus may collect in the antrum as a consequence of catarrhal inflammation extending from the nose. The patients usually complain of pain in the region of the upper jaw, and if the collection of pus be considerable, it may flow into the nasal meatus and out through the nostril or back into the pharynx when the patient lies on the opposite side. Empyema is not a common affection, because the lining mucous membrane is very thin and poorly supplied with follicles. The most common source of purulent inflammation is from disease of the teeth, especially of the posterior molars, forming either subperiosteal abscess or abscess of the antrum itself. Another

form of disease met with in the antrum is *polypoid cysts*, which may originate here, but are much more likely to arise in the naso-pharynx and involve the antrum secondarily.

*Tumors.*—Pathological new growths of the superior maxilla differ in their clinical appearances according as they start from the alveolar arch or from the body of the bone. The former are, of course, visible in the mouth. Tumors of the antrum are difficult to recognize if they have not already caused distention of the sinus. The symptoms are pain in the upper teeth, a dull pain in the region of the antrum, discharge of pus and blood from the nose in lying down, and more or less epiphora or overflow of tears. As the tumor grows, the walls of the antrum are gradually absorbed and a new thin scale of bone is developed from the periosteum. This may occur in the anterior wall, or in the orbital wall, or in the alveolar wall, and the tumor soon extends toward the nose and causes great enlargement of the hole communicating with the nasal meatus. These nasal growths extending from the antrum are often erroneously mistaken for nasal polypi. Finally the growth frees itself from its bony envelope and comes to lie immediately under the soft parts. If a swelling appears simultaneously in all the above places, a diagnosis may be made of tumor in the antrum. Protrusion of the anterior wall of the antrum alone might mean a cyst of one of the tooth cavities or a periosteal tumor, as well as a tumor of the antrum. In such cases puncture with a trocar would probably differentiate between an external and an internal tumor. A large tumor of the antrum would probably increase the breadth of the cheek, would push the nose toward the opposite side, and would push the eye upward and outward. If the tumor grows from the bone itself, the inferior orbital margin is decidedly broadened. Tumors of the antrum itself rather tend to break through into the nose, the mouth, or the orbit.

Tumors of the superior maxilla, whether they start from the bone or the antrum, gradually extend into all the neighboring cavities. They early involve the nasal meatus, thence extend into the spheno-maxillary and palatine fossæ and pharynx, and

finally perforate the base of the skull. They usually involve the orbit later, and sometimes extend into it from the ethmoid cells, even before the floor of the orbit is perforated. The treatment of these tumors consists either in extirpation of the growth, in partial resection, or in total resection of the superior maxilla.

*Tumors of the Naso-pharynx.*—Fibroid tumors of the pterygo-palatine fossa may enter the orbit through the infra-orbital fissure. They cause neuralgia of the infra-orbital or posterior alveolar nerves. The orbital portion of the tumor may divide into two branches, one involving the eyeball and the other extending into the cranial cavity, through the supra-orbital fissure. These tumors eventually extend into all the neighboring cavities.

## CONCLUSIONS.

*Tumors of the Sphenoid.*—So long as a pathological process, whether it be inflammatory or a new growth, is limited to the antrum of the sphenoid, the subjective symptoms are either entirely absent or there may be severe pain in the head. If the process extends to the neighboring structures, symptoms arise which point to the probability that the sphenoid bone is the seat of the disease—such as blindness due to compression of one or both optic nerves, the visible or tangible presence of the growth in the naso-pharynx, ethmoid, orbit, or skull. The entrance of the growth into the cranial cavity may occur without any subjective symptoms, or there may be severe headache. If the progress of the growth is very rapid, meningitis or cerebral abscess will result. The ophthalmoscopic symptoms are either papillitis or atrophy of the optic nerves, due to perineuritis and pressure of the swollen nerve-sheath on the optic nerve-fibers. In some cases the pressure is exerted on the optic nerve in the optic canal. Tumors of the sphenoid antrum may perforate the middle fossa of the skull without causing blindness, and when blindness does occur in these cases, it is not necessarily due to pressure on the optic chiasm, for it may

be unilateral. If an orbital tumor rapidly causes blindness, and the latter starts from the temporal side of the field and leaves the region of the macula lutea unaffected to the last, and if at the same time a growth appears in the naso-pharynx, it is probable that the tumor began in the sphenoid antrum.

*Tumors of the Ethmoid.*—A morbid growth confined within the ethmoid cells gives rise either to no symptoms at all or merely to headache. Inflammation of the mucous membrane lining the ethmoid cells may extend from the naso-pharynx, the frontal sinus, the maxillary antrum, or the orbit. The ethmoid cells may be turned into a single large cavity by a collection of mucus or pus within it. So long as a tumor is contained within the limits of the ethmoid cells there are either no subjective symptoms or there are paroxysmal headaches, with a feeling of heat and epistaxis. The orbital symptoms are the same as those of tumor of the orbit. The motility of the eyeball is limited. The vision may be only slightly affected, or there may be complete blindness. The visual field may not be affected. If the tumor has entered the naso-pharynx, the mouth is more or less open and the speech is nasal. Later there is loss of the sense of smell. If the ethmoid cells are opened into by the growth, there is more or less continuous dropping of cerebro-spinal fluid from the nose, owing to a communication between the upper wall or roof of the ethmoid cells and fissures at the base of the skull. There may also be orbital or palpebral emphysema, and hemorrhage from the nostril on the same side.

*Mucocele, or Abscess of the Frontal Sinus.*—In chronic inflammatory disease of the frontal sinus there may or may not be supra-orbital pain. If the process is confined to the frontal sinus, there is no other symptom. If, in addition to the pain, there is sensitiveness on pressure over the frontal boss, swelling along the lower surface of the supraorbital margin and along the inner wall of the orbit, and displacement of the eyeball downward and outward, it is probable that the disease has extended from the frontal sinus to the ethmoid cells. If, in addition to these symptoms, there are coryza, ozæna, and a puru-

lent discharge from the nostril, the nasal meatus has become involved and the diagnosis is certain. But, unless all of these symptoms are present, the diagnosis is very difficult and almost impossible. If the first symptom of orbital complication is the appearance of a dense, hard swelling at the upper and inner angle of the orbit, along the superior orbital margin and region of the lachrymal bone, and if the growth is slow and painless, the disease is almost certainly an *osteoma* of the frontal bone, which will eventually involve the orbital plate of the ethmoid, and later the cavity of the skull.

*Tumors of the Maxillary Antrum.*—Tumors of the antrum may cause pain in the teeth or in the region of the infra-orbital nerve, but not until they have attained considerable size and have more or less completely filled the antrum, the distention of the walls of the cavity causing the pain by pressure on the nerve-twigs. Subsequently the diagnosis may be rendered easier, either by a projection forward of the anterior bony wall, or by dislocation of the eyeball upward and outward, or even upward and inward, by the protrusion of the floor of the orbit. Usually at this stage of the growth the tumor may also present in the nasal meatus, or pharynx, or both. In no case is it possible to diagnosticate a tumor of the antrum early in its development.